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Russian Preparations for the Observation of the Transit of Venus of 1874. By M. Otto Struve.

(*Extract from a Letter addressed to the Astronomer Royal*).

With regard to the preparation for the transit of *Venus*, I am glad to say that here in Russia all goes on in a regular way.

The inquiries on the meteorological conditions of the selected stations have given, on the whole, very satisfactory results, particularly for the stations on the coast of the Pacific Ocean, and in Eastern Siberia (about 85 per cent clear sky in December). There are only two stations, Taschkent and Astrabad, for which these conditions are not sufficiently satisfactory; therefore the observers designed for Taschkent will probably go to a place about 100 miles west of that town; and instead of Astrabad, we shall either take the island of Aschuradeh, in the Caspian Sea, or, if possible, cross the Elburz mountains and establish our observers at Schahrech in Persia, with nearly an absolute certainty of clear sky.

The total number of Russian stations will be twenty-four, but each of them will be provided with only *one* instrument for the transit-observation itself. We hope in this way to increase the meteorological chances. The instruments will be,—

1. Three 4-inch heliometers, ordered from Repsold.
2. Three photoheliographs, ordered from Dallmeyer.
3. Four 6-inch and four 4-inch equatoreals, ordered from Repsold; all provided with clockwork, filar micrometer, and spectral apparatus.
4. Ten 4-inch telescopes, designed merely for contact-observations.

Of course each station will be also provided with clocks, chronometers, and the instruments required for the exact determination of time. The principal instruments are already ordered, and most of them will be here in the course of the present or beginning of next year. For these instruments, also, the observers are in a great part already nominated. They will all come to Pulkowa for a certain time next year, to exercise themselves in the observations.

The geographical positions of the selected stations will not be determined by the transit-observers themselves; but all stations at which the transit has been successfully observed will afterwards be carefully determined by special expeditions of the General Staff of the Navy. For this purpose a principal line of telegraphic longitudes will be laid (probably next year) through all Siberia to Nicolajensk, with which line the other stations in that part of the empire can be easily joined, either by telegraphic or chronometric operations.

With regard to the photographic method, I can inform you that in two places—at Wilna, under the direction of Colonel

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Smysloff, and at Bothkamp in Holstein by Dr. Vogel—they have perfectly succeeded in taking instantaneous photographs of the Sun with *dry* plates.

As far as I know, in Germany the preparations have not much advanced since last spring. The estimates have not yet been laid before the Reichtag, but it is expected that this will be done early in the spring. In the meanwhile Dr. Winnecke has been engaged with practical experiments concerning the heliometric method. He seems to be quite satisfied with the results. Also M. Paschen and Professor Seidel have been working on the photographic method, and Professor Zöllner on the application of the spectroscope for the observation of outer contacts. On these points I am not yet enabled to communicate positive results.

Pulkowa, February 26, 1872.

Eclipse of December last. Australian Expedition. By H. O. Russell, Esq., Government Observer at Sydney.

You are, no doubt, aware that the Royal Society of Victoria made arrangements to observe the recent total eclipse of the Sun. As the Government of New South Wales liberally contributed 300*l.* towards the expense of the expedition, I, with an observing party of five persons, joined the expedition to represent New South Wales. As no vessel offered in Victoria at any sum within the means of the promoters of the expedition, the *Governor Blackall* steamer was fitted out in Sydney for the expedition, and started, on the 27th of November, for Cape Sidmouth. Circumstances induced the observers to select No. 6 Woody Island in preference to the mainland, and upon that part of it (a mere sandbank), which is dry at high water, the two observatories (Victoria and New South Wales) were erected.

As all the instruments sent out by the Royal Society were used by the Victorian party, I was obliged to take such instruments as I could command in Sydney. These were a $7\frac{1}{4}$-inch refractor, by Merz and Son, mounted equatoreally, and driven by the clock; the eye-piece was removed, and a camera-box put in its place for the purpose of taking photographs during totality, a camera lens of 3-inch aperture and 30 inches focus, mounted in a very light camera, weighing when complete only 6 lbs., was attached to the tube of the refractor, and arrangements were made to uncover the telescope and camera by the same motion of the operator's hand. Two small telescopes, $2\frac{3}{8}$ and $2\frac{1}{7}$ inches apertures, mounted equatoreally, and driven by clockwork: in each of these position lines at right angles, were placed to facilitate making the drawings. Also, a $3\frac{1}{2}$-inch telescope, mounted equatoreally, and moved by hand. Lastly, tents and a complete pho-

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tographic dark room, with 20 baths, and other things in proportion, to take 20 pictures during totality.

On the day they were landed all my instruments were put up and in part adjusted; during the next day adjustments were completed: and on the third day photographic practice began, and some good pictures were obtained. Experiment also convinced me that we might keep a plate out of the bath at a temperature of 80° for ten minutes, expose it and keep it ten minutes more, before developing, without any serious injury.

On Monday morning we had a full rehearsal and practice all day. All this time, though there had been a continued haziness in the atmosphere, we hoped that we might yet have it clear enough to see something. Monday evening, however, brought heavy clouds and a very severe thunder-storm, during which the lightning passed down the iron stays of the ship five times; and exploded between the stay and the hull, fortunately without damage. Heavy rain followed and continued at intervals all night and the next day; every preparation was, however, made, and nine plates prepared for exposure, even though it rained heavily, and no hope was left but in a possible rift in the clouds. One minute before totality I saw through dense clouds the line crescent of the Sun, but during totality nothing could be seen but a faint light in the clouds in the direction of the Sun; two plates were put in, and exposed 40 seconds, but not a trace of anything was obtained. During totality it was not dark: a peculiar blue grey, extending over clouds and landscape, gave yet abundance of light to read ordinary print. First and last contact were not seen: indeed, except at 1^{h} 40^{m} P.M., and one minute before totality, I saw nothing of the outline of the Sun.

During all the eclipse our sky was entirely overcast, and yet fifteen miles north of us the crew of a small schooner saw the eclipse, their attention being drawn to it by the darkness. It was quite evident from their evidence that there were light clouds over the Sun during totality; and although they state that there was a ring of light at the spot where they had seen the Sun, their description was very unsatisfactory and vague.

The two small telescopes driven by clockwork were taken in accordance with the instructions; larger ones could have been obtained if I had been able to get spectroscopes to use with them, but I could not.

Sydney Observatory, 29th December, 1871.